Space Weather Forecast

Issued on Saturday, 17 September 2022 at 01:13 Local

This forecast provides a four-day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

---

Space Weather Forecast Headline: Now reduced chance of Moderate-class X-ray flares. Slight Chance Minor Geomagnetic Storm G1 into new UTC working week.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity was high over the past 24 hours, with a pair of moderate-class X-ray flares originating from the largest and most complex sunspot region on the northwestern solar horizon. The first and largest of these peaked at 16/0949 UTC; with the second at 16/1559UTC. Neither of these events appears to have spawned either a solar radiation storm or Coronal Mass Ejections (CMEs).

Including the above sunspot group, there were four solar regions on the Sun in the period, although the largest, most active and most complex of recent days, became difficult to discern by the period's end, with only its trailing spot visible as the rest crossed onto the far side. The other residents of the facing side were less active and smaller magnetically bipolar regions.

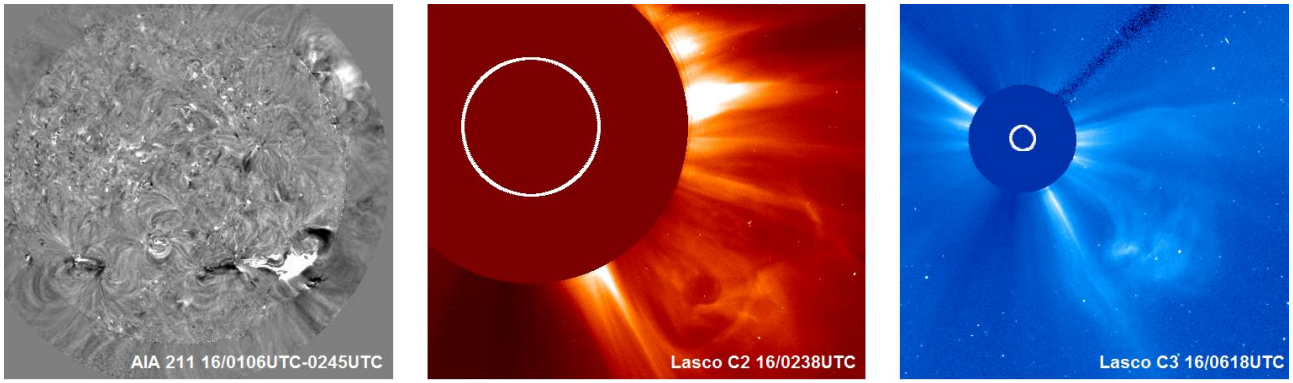


Figure 1: Three perspectives of the CME(s) from the southwest of the Sun in the period. A glancing blow at Earth is possible late in the UTC day of Sunday 18 September, giving a slight chance of Minor Storm G1 conditions on this day and into Monday. Image processing for leftmost image courtesy of SIDC ROB.

Satellite imagery for the 24 hours was dominated by a pair of 'filament eruptions' (arcs of plasma leaving the Sun) from the southwest, starting around 15/2100UTC and 16/0100UTC. Of these, the latter was the more impulsive and violent, and as a result appears to have consumed the former in imagery. These features have been analysed as a unified CME, with a possible glancing blow of Earth expected late in the UTC day of Sunday 18 September.

Solar Wind / Geomagnetic Activity: The solar wind was characteristic of the tail end of CME influence ongoing since 14/2150UTC, segueing into a slow regime. The solar wind speed showed an erratic but very slightly increasing trend, albeit still within normal background levels. The number of particles comprising the solar wind was highest as the CME gave way to the slow

© Crown Copyright 2022. All Rights Reserved.

regime, but soon fell into its long term background range to end the period. The magnetic field associated with the particles showed a reducing trend, from slightly elevated levels to finish comfortably at background. The north-south component of the magnetic field was greatest in magnitude with the tail of the CME's magnetic cloud but was crucially co-aligned with Earth's field to limit effects.

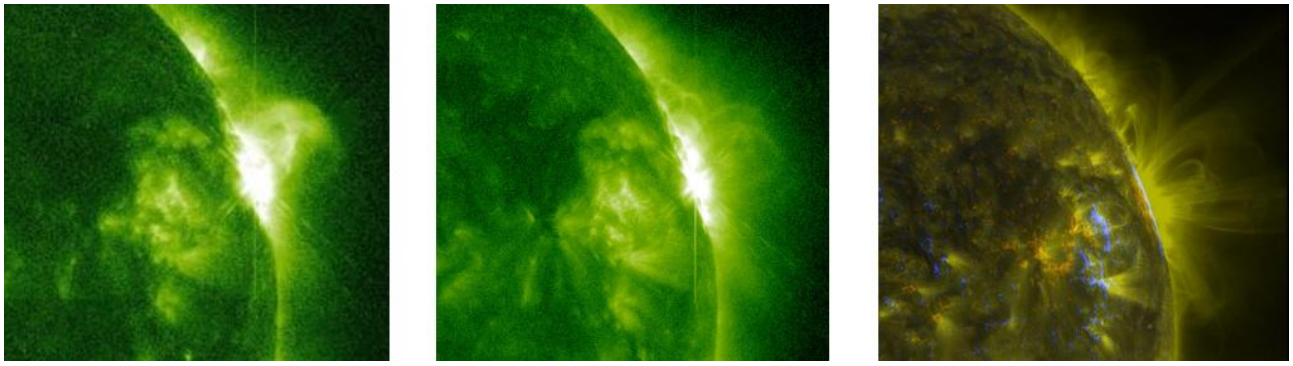
The net result of the above solar wind measures was universally quiet geomagnetic indices - near the bottom of the measurement scale and well below G1 Minor Geomagnetic Storm.

Energetic Particles / Solar Radiation: Solar radiation remained slightly elevated over the 24 hours, with a slightly rising trend to a peak of 3pfu that later moderated a little (where 10pfu is S1).

Four-Day Space Weather Forecast Summary

Solar Activity: Solar activity is expected to fall with the passing of the recent largest spot group, although for day one it probably remains near enough the front side to throw X-ray producing ejecta clear of the horizon to give a peak chance of moderate-class X-ray flares for the four days. No notable regions are due over the eastern solar horizon to counteract this fall.

Figure 2: False colour extreme UV images of the two Moderate-class X-ray flares from the departing largest sunspot group in the period: from left to right at 16/0949UTC, and 16/1559UTC. Also shown is the spot in different wavelengths that characterise magnetic fields as they appeared at 16/2319UTC.



Solar Wind / Geomagnetic Activity: There is one unified CME that features in the current forecast - the product of two 'filament eruptions' starting 15/2100UTC and 16/0100UTC from the southwest. These may give a glancing blow late in the UTC of Sunday 18 September, and a corresponding Slight Chance of Minor Geomagnetic Storm G1.

The forecast coronal hole fast wind is overdue and correspondingly is now expected to be more muted, perhaps greatest should it arrive concurrently with the above CME - at the end of the current UTC weekend.

Initially quiet conditions may rise to a slight chance of Minor Geomagnetic Storm G1 late Sunday 18 and through Monday 19 September, returning to quiet on Tuesday.

Energetic Particles / Solar Radiation: The chances of S1+ level solar radiation storms are slightly elevated given the already enhanced near-Earth environment, although the trend is downwards as the most liable spot to produce such events rotates away from a favourable position in the period.

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2022. All Rights Reserved.

Met Office Space Weather Forecast

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	20	20	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	30	20	20	20
Very Active	R3 to R5 X	No	5	1	1	1

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	10	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

Issued by Met Office Space Weather Advisor, Tel: +44 (0) 330 135 4254 Email: moswoc@metoffice.gov.uk

© Crown Copyright 2022. All Rights Reserved.